

METHOD FOR PROVIDING INFORMATION FOR PARALLEL PARKING OF A  
VEHICLE

## Technical Area

The present invention relates to a method for providing information for parallel parking of a vehicle according to the definition of the species in Claim 1.

## 5 Background Information

Growing traffic density and the increased development of open spaces, in metropolitan areas in particular, continuously constrict the room for traffic movement. The available parking spaces are becoming smaller and the search for a suitable parking spot, in addition to the continuously growing traffic volume, puts an extra burden on the driver. When backing into a parking spot in particular, it is frequently considerably difficult to correctly judge the exact size and position of the parking spot.

15 Known are driver assist systems for vehicles which support the driver in various driving situations, e.g., when maneuvering or pulling into and out of parking spots. Among other things, systems for measuring parking spots are known which, when driving past the parking spot, already inform the driver in a  
20 suitable manner about the size of the parking spot so that, based on this information, the driver is able to make a sufficiently safe decision/prognosis on whether parking in this parking spot is reasonable. It is known to measure the size of the parking spot using sensors on the side of the  
25 vehicle, preferably ultrasound sensors, and to communicate this measured value to the driver in a suitable manner.

It is disadvantageous in the known parking spot measuring systems that the driver of the vehicle must initially relate the measured value of the parking spot measurement to the vehicle length in order to decide, based on the relationship of vehicle length and parking spot length, whether the measured parking spot has a suitable length for parking. This procedure requires some concentration resulting in the driver's attention toward the traffic situation being adversely reduced.

10 Description of the Invention, Object, Approach, Advantages

Therefore, it is the object of the present invention to make available a method for providing the driver of a vehicle with information for parallel parking the vehicle in a parking spot delimited by (at least) two obstacles, via which the driver is informed particularly quickly and in a particularly suitable manner about the length (size) of the parking spot in relation to the length (size) of the vehicle. The driver is to be distracted from the traffic situation as minimally as possible.

20 This object is achieved by a method having the features recited in the characterizing part of Claim 1 in cooperation with the features in the preamble. Preferred embodiments are included in the subclaims.

Due to the fact that after detection of a first obstacle, delimiting the length of the parking spot, the vehicle and its position in relation to an already detected part of the parking spot is shown on a display assigned to the driver, the relationship of vehicle length and parking spot length or the detected part of the parking spot corresponding, or essentially corresponding, to the relationship of the vehicle length shown on the display and the shown parking spot length or the already measured part of the parking spot, the vehicle

driver obtains suitable information about the relationship of vehicle length and parking spot length based on the true-to-scale display already while the vehicle is passing the parking spot, formed by the two obstacles, and thus during the measurement of the parking spot length. The important advantage of the method according to the present invention is that it is not the absolute length of the parking spot that is communicated to the driver (visually, acoustically, haptically), but rather that the relationship of vehicle length and parking spot length is graphically displayed. The absolute length of the parking spot is not essential for deciding whether or not the parking spot to be measured is large enough, instead only the relationship of vehicle length and parking spot length is essential. It is necessary for the length of the parking spot to exceed the vehicle length in order to allow parking in the parking spot. Based on the true-to-scale visual display of the vehicle and the parking spot according to the present invention, the driver receives information in a particularly suitable manner while passing the parking spot about the prospects of a successful parking operation, the distraction from the traffic situation being minimal.

A preferred embodiment of the method according to the present invention provides for the length of the already measured part of the parking spot to be displayed in relation to the minimum length needed for parking subsequent to the detection of the first obstacle, which delimits the parking spot length, and prior to the detection of the second obstacle. A further preferred embodiment of the present invention provides for the already detected part of the parking spot to be displayed in a predefined color as a function of its length during the parking spot measurement. A particularly preferred design variant provides for the part of the parking spot, already

detected during the parking spot measurement, to be displayed in red provided that its length is less than the minimum length for parking the vehicle. This makes it possible for the vehicle driver to be able to recognize while passing the parking spot based on the color red that the part of the parking spot measured so far is not sufficiently large for parking. If the part of the parking spot, already measured while the vehicle passes the parking spot, has a length which is greater than or equal to the minimum length for parking the vehicle in the parking spot, and if this already measured part is not or only slightly greater than this minimum length so that driving into the parking spot is not comfortably ensured, a particularly preferred design variant provides for display in yellow of the already measured part of the parking spot or of the part of the already measured part of the parking spot which exceeds the minimum length of the parking spot. In this case, the color yellow informs the driver that the parking spot is sufficient for parking but is not long enough for comfortable and easy parking (without pulling in and out multiple times). If the parking spot measurement shows that the measured parking spot has a length which makes easy driving into the parking spot possible, the already measured part is displayed in green in a preferred design variant. In this case, the green display of the parking spot indicates to the driver that the parking spot is long enough for easy parking.

Analogous to the above-mentioned color representation of the parking spot during the parking spot measurement, a preferred design variant provides for display of the parking spot in a predefined color after detection of the second obstacle delimiting the parking spot as a function of its length. The parking spot measuring process is completed after detection of the second obstacle and the length of the parking spot is

established. The color representation signals to the driver in a rapid and simple manner whether the parking spot is too small (color red), sufficient - but tight - (color yellow), or sufficient for easy parking (color green).

- 5 The vehicle and the already measured part of the parking spot as well as the vehicle's position in relation to the already detected and measured part of the parking spot are preferably displayed in a perpendicular top view via a display unit assigned to the driver. The actual driving direction of the  
10 vehicle preferably corresponds to the displayed driving direction of the vehicle.

Subsequent to the detection of the second obstacle, delimiting the length of the parking spot, the parking spot measuring system is immediately active again in order to measure  
15 additional parking spots. The parking spot measurement ends either after a second obstacle is detected or when the size of the parking spot is determined to be sufficient for easy parking without another obstacle being detected. (The parking spot is thus delimited by only one vehicle). Also in this  
20 case, the parking spot measuring system is immediately active again in order to measure additional parking spots. The present invention also provides for the driver to optionally also be able to manually re-start the parking spot measuring system.

- 25 A further preferred design variant provides for the vehicle's position data and the parking spot's position data to be stored during the parking spot measurement so that, if needed, the driver is able to re-display a predefined number of previously measured parking spots on the display unit. This is  
30 particularly advantageous in areas of tightly limited parking space supply when several parking spots are available which have the minimum size but are tight. The vehicle driver may

then drive past all parking spots, the length of the respective parking spot being measured and stored during passing. Using the stored parking spot measurements, the driver is then able to compare the individual parking spots with respect to their length and select one of the parking spots.

#### Brief Description of the Drawing

The present invention is described below in greater detail in an exemplary embodiment based on the attached drawing.

10 Fig. 1 shows a schematic representation of information for parking spot measurement according to the present invention at the beginning of the parking spot measurement;

15 Figs. 2 and 3 show a schematic representation of information for parking spot measurement according to the present invention during the parking spot measurement, and

20 Figs. 4 and 5 show a schematic representation of information for parking spot measurement according to the present invention after the completed parking spot measurement.

#### Best Approach for Carrying Out the Invention

In order to inform the driver of a vehicle about the parking spot measurement and thus in a particularly suitable manner whether the measured parking spot is large enough for parking, the present invention provides for the vehicle and its position in relation to the parking spot or to the already detected part of the parking spot to be shown on a display unit assigned to the driver. At the beginning of the measuring process of the parking spot measurement, i.e., when a first

obstacle which delimits the length of the parking spot is detected, vehicle 10, the beginning of parking spot 14 which is represented by the first obstacle, and driving direction 20 are shown on the driver's display unit. Moreover, it is provided to show end point 16 of a parking spot including a minimum length on the display unit. Without looking over the shoulder, which would represent a distraction from the traffic situation, the vehicle driver is able to use this display to ascertain how far past the first obstacle he has gone, as is schematically shown in Figure 1. The placement on the vehicle of the sensors used for the parking spot measurement is of utmost importance for establishing how far past the first obstacle he has gone in order to be able to detect the obstacle. Already measured part 12 of the parking spot is constantly displayed during the vehicle's further passing of the parking spot to be measured (Figures 2 and 3). The vehicle driver is informed in a particularly suitable manner how large the already measured part of the parking spot is compared to a parking spot with a minimum length which is indicated on the display unit by end point 16. In order to inform the driver as quickly as possible about whether the size of the parking spot (during or after its measurement) is sufficient for parking the vehicle, the ratio of the vehicle length to the length of the parking spot or to the already measured part of the parking spot corresponds to the ratio of the displayed vehicle length (vehicle 10) to the displayed (measured) parking spot or to displayed, already measured part 12 of the parking spot. The absolute length of the parking spot is known after the second obstacle is detected. At this point, end 18 of the parking spot may be graphically displayed to the driver. If the length of the parking spot is less than the minimum length (Figure 4), this is indicated by red coloring of the displayed parking spot or displayed part 12 of the parking spot. However, if the parking spot is sufficient (Figure 5) the

parking spot is displayed in the color green. If the parking spot is sufficient but tight, the displayed parking spot or displayed part 12 of the parking spot is shown in yellow.